



# OPERATOR'S MANUAL

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Date : 01/03/2021  
Page : 1 of 6

## 1. GENERAL

The aim of this manual, written in accordance with directive **2014/68/EU**, is to provide the necessary instructions for the safety, installation, use and maintenance, as well as the packaging, shipment and storage of the EPE hydropneumatic piston accumulators, bearing the **CE** mark 0343 (Certifying authority code) produced for the European market.

In particular, it concerns the “High Pressure” Series, (see table 1) for **group 2** fluids (not dangerous), subject to the conformity assessment procedures in accordance with modules **H / H1**, as laid down in the European Directive for Pressurised equipment **2014/68/EU**.

The following are laid down for each type of accumulator:

- The calculation, static and fatigue strength report. No additional external loads (like wind, seismic etc) are considered during verification;
- A hydrostatic test at a pressure  $\geq 1.43$  PS (max. working pressure);
- Final hydraulic test on each accumulator to test sealing of the components. This test is equivalent to 4 times the precharging pressure (Po) indicated by the end user, but not greater than the maximum working pressure (PS) stamped on the cylinder and, in any case no less than 120 bars. This pressure is equivalent to 4 times the standard storage precharging pressure and the accumulators to be provided with lower or even no precharge are also tested at this pressure.

Their safety is guaranteed not only by the quality of the design, construction and testing by the manufacturer of the accumulator but also by their correct use by the user who is obliged to **strictly follow the instructions given in this manual**.

**These accumulators may not be used with group 1 fluids** (dangerous or aggressive fluids), or for pressure or temperature different from those specified. Ensuring compatibility of the vessel and sealing elements with the working medium is the responsibility of the user.

Should these needs arise, we recommend you call our Marketing & Servicing Department. Damage to things or injuries to persons caused by the failure to follow these instructions, **dispenze the manufacturer from all liability**.

## 2. IDENTIFICATION DATA

Table 1

HIGH PRESSURE HYDRO-PNEUMATIC PISTON ACCUMULATOR														
- Only for group 2 fluids -														
Type	AP-___													
	6	8	10	15	20	25	30	35	40	45	50	60	70	80
Max. allowable working pressure PS (bar)	450													
Test Pressure PT (bar)	643.5													
Permitted No. of Load Cycles & Range of pressure variation	> 2,000,000 at 70 Bar													
Volume of nitrogen V (liters)	6	8	10	15	20	25	30	35	40	45	50	60	70	80
Dry mass M (kg) approx	88	96	103	122	141	160	179	197	216	235	254	292	329	367
Min./Max. allowable working and storage temperature TS (°C)	Standard : -20°C ~ +80°C. On request : -40°C ~ +80°C													
Materials	Accumulator Tube : P460N													
	End Covers & Cover Rings : A350 LF2 / P355NH													
	Piston : AL HF 15 WP													
	End Cover Seals : P (NBR). On request : V(FKM)													
	Gas Fill Valve : A350 LF2													
Protective coatings	Standard - Epoxy Red Oxide Primer.													



### 3. ACCUMULATOR MARKINGS (name plate)

The name plate at the gas side of the accumulator bears the following data:

- The name, logo and contact details of the manufacturer.
- The CE mark with No.0343 of the Certifying Authority.
- The fluid group
- The alphanumeric model code assigned to the accumulator.
- The manufacturing number / serial number of the accumulator.
- The maximum allowable working pressure PS in bar.
- The precharging pressure Po in bar.
- The minimum and maximum allowable temperatures TS (°C)

**The alphanumeric code (see table 2) uniquely defines:**

- |  |                                      |
|--|--------------------------------------|
| - The type of the accumulator            | - The material of the body           |
| - The rated volume in liters             | - The material of the piston         |
| - The material of the seals              | - Gas Side & Liquid Side Connections |
| - The maximum allowable working pressure | - Final Tests                        |
| - The inner diameter of the accumulator  | - Special Construction, if any.      |

3a. **CODIFICATION / ORDERING CODE** : as per annexure hereto.

Table 2

AP - 35 - 450 - 180 - C - 2 - PPU - P - 0 - 0 - 0 - FV - 0 - G07F - 0 / P0:10 / - -   -  

↑ indicate only if applicable ↓

**Warning : Modifying or adding data to the markings without the manufacturer's authorization is prohibited.**

### 4. SHIPMENT AND STORAGE METHODS

The accumulators are supplied with a nitrogen precharge pressure expressly specified by the customer. In cases where no indication has been given, they are supplied without any storage/precharge pressure. The precharge pressure is indicated on the name plate of the accumulator.

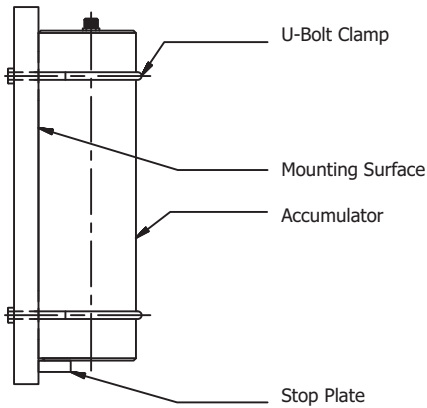
**For shipment** the accumulators are packed either in cartons or in boxes or on pallets. This package is suitable for storage at the warehouse but not for stacking during transportation.

**On receipt** make sure that the package and accumulators have not undergone damage during transportation. The goods must be handled with care so as to avoid knocking, above all, the gas valve and the name plate.

**When stored** they are to be kept in horizontal position in a cool and dry indoor environment.

**Do not expose to flames or heat.** The storage condition may affect the aging of the elastomers. In any case, the seals are to be replaced after 6 years.

## 5. MOUNTING ARRANGEMENT Mounting Instructions



The accumulators should be properly fitted / clamped on the system. Clamping should not cause the accumulator shell or the accumulator connection to be stressed due to over tightening. It is necessary, especially with larger capacities / lengths, horizontal mounting or with heavy units, to use fasteners (clamps, brackets etc) that support the accumulator and prevent dangerous vibrations.

To achieve a high degree of efficiency, the accumulator should be fitted as close as possible to the installation it serves. The space necessary for charging & gauging kit is atleast 150mm above the gas fill valve.

### Position

It is suggested that the accumulators are installed vertically with gas side on top. The manufacturers name plate stating the initial pressure must be visible.

The mounting must be such that, should a rupture occur on the pipe system at the liquid connection, or should the gas fill valve break, the accumulator cannot be pulled from its mounting by the forces involved. No welding or other mechanical process must be carried out on the accumulator shell for the purpose of attaching fasteners.

### Construction

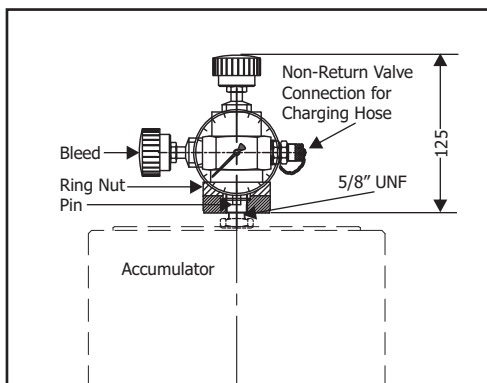
The mounting U-Bolt Clamps for piston accumulators are manufactured from carbon steel duly surface protected. They are supplied along with 2 Nos. Nuts and flat washers.

### Checking & Charging

## 6. NITROGEN CHARGING

Pre-Loading & Checking Set type-PC is to be used for checking / charging of the Piston Accumulators. When charging, the nitrogen bottles must be capable of delivering pressure higher than the desired accumulator gas pressure.

Use dry industrial nitrogen. **NEVER USE OXYGEN OR AIR.**



Proceed as follows:

- Fit the suitable pre-charging equipment to the gas valve;
- Connect it to the nitrogen cylinder with the charging hose;
- Slowly introduce nitrogen into the accumulator until reaching a pressure slightly above the required level;
- Close the valve of nitrogen cylinder and disconnect the charging hose from the equipment;
- Wait for the gas temperature stabilization;
- Set the pressure by venting off the excess of gas.

**A PRESSURE REDUCING VALVE MUST BE INSTALLED BETWEEN THE NITROGEN GAS CYLINDER AND THE ACCUMULATOR WHEN THE GAS CYLINDER PRESSURE IS HIGHER THAN MAX PERMISSIBLE PRESSURE OF ACCUMULATOR.**



## 7. PUTTING INTO OPERATION

The EPE Piston Accumulator is designed, manufactured and tested in accordance with current standards. The maximum working pressure, model, precharge pressure, serial number and year of manufacture are marked on the Accumulator name plate.

### Instructions.

- Do not machine or weld the Accumulator body.
- Precharge gas must be nitrogen unless otherwise agreed between manufacturer & user.
- Do not use liquids incompatible with the material of construction.

For system & personnel safety, ensure that all the necessary precautions for pressure vessels are taken.

### Preliminary Checking.

On receipt of the Accumulator, check to ascertain that

- The Accumulator is not damaged in transit.
- The identification code is as per the order.

**Before installation**, it is essential to check that

- The working pressure marked on the Accumulator is higher than the maximum operating pressure of the system and
- The Accumulator is precharged to the required pressure.

### Installation.

EPE Piston Accumulator may be installed in any position. However, the vertical position (fluid port down) is preferred.

- Leave sufficient space to allow use of the precharging equipment.
- Leave the name plate clearly visible.
- Ensure space for easy removal of Accumulator from the system.

**Connection** to the fluid port requires

- An isolation and unloading valve.
- A relief valve.
- A pressure gauge connection.

This can easily be obtained by using standard EPE Accumulator safety blocks type B.

### Mounting

There must be no additional forces or moments acting on the Accumulator other than those due to the fluid power system. The Accumulator mounting (brackets, clamps etc.) must ensure that the mechanical movements and vibrations are safely absorbed so that liquid and gas connections do not become additionally loaded. No machining or welding should be carried out on the Accumulator for the purpose of mounting. The connection of the accumulator nozzle to the external piping should be force and torque free.

### Putting into service.

**Before the system is pressurised, check that**

- The precharge gas is at the required pressure.
- The setting of the safety valve or relief valve is lower than the maximum working pressure of the Accumulator, and
- Air is vented from the piping.

### Periodic Checks

The Accumulator should be checked to ensure that the gas pressure has not reduced. Before checking, the Accumulator must be isolated from the system and the fluid drained. An initial check is required during the first week of installation.

A second check should be carried out approximately 3 months later and subsequent checks after every 3 to 6 months.

## 8. MAINTENANCE

### Maintenance

Before removing the Accumulator for servicing, isolate it from the hydraulic circuit and reduce pressure to zero by draining the fluid from Accumulator to reservoir.

#### Repair

Repair work can involve replacing the Piston, Piston Seals or Gas Fill Valve. For safety and functionality, use only parts supplied by EPE.

Before any repair work is undertaken both the liquid and the gas chambers have to be completely depressurised

#### Disassembly.

- Firmly fasten the Accumulator in a vice.
- Completely depressurise the Accumulator.
- Charge, the accumulator with fluid under pressure in a way to bring the piston and the end of the stroke at the gas side.
- Completely discharge fluid pressure.
- Remove the Gas Fill Valve .
- Before removing the Covers tap them with aluminum hammer in order to release tension on the side of the thread.
- Screw two screws into the threaded holes and using a bar as a lever, unscrew the Gas Side Cover.
- Remove the Gas Side Cover carefully to avoid damage to Accumulator threads.
- Push out the Piston if you have access at the sides or else pull the Piston out using an eyebolt carefully to avoid damage to the Piston, Piston Seals & Accumulator threads.
- Check the internal surface of the cylinder body which should be bright and free from scratches.

#### Reassembly.

- Check the internal surface of the cylinder body which should be bright and free from scratches.
- Remove all gaskets from pistons and cover rings taking precaution not to scratch or damage the faces.
- Clean the faces.
- Lubricate all the seals, gaskets and guide strips in the piston, taking care not to damage during assembly. Fit to respective faces.
- Position the assembly sleeve from the end where the piston is to be inserted, and after having lubricated; push the piston in towards the internal of the accumulator body.
- With the accumulator vertically positioned, with gas side towards the top, pour approximately 100 ml of mineral oil on the internal surface of the accumulator, in order to keep the gaskets lubricated in the nitrogen chamber and to avoid oxidation as a result of eventual humid residue of gas.
- Reassemble the Gas Side Cover and tighten firmly.
- Replace the Gas Fill Valve.

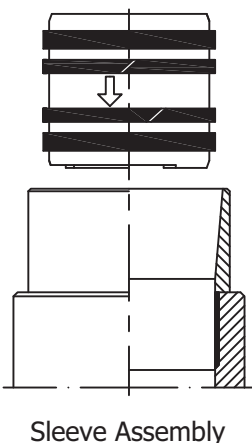
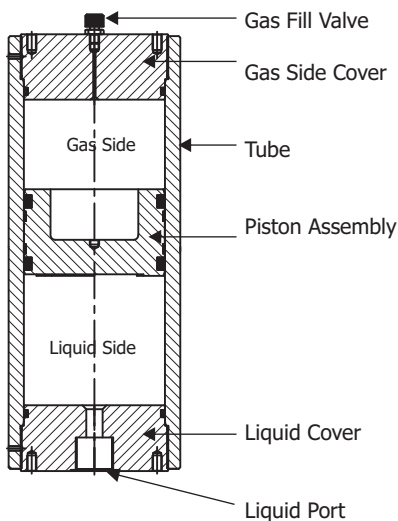
#### Precharge.

- Carry out precharging using EPE pre-loading and checking equipment, Type-PC.
- Only dry industrial nitrogen should be used.

Follow procedure as explained in “Checking & Charging” on page-3.

## 9. ASSEMBLY EQUIPMENT

The sleeve equipment to re-assemble the piston accumulators is necessary every time an accumulator needs to be stripped for maintenance (For example, when replacing piston seals) and then re-fitting the piston to the accumulator.



## 10. SPECIAL INSTRUCTIONS

Before installation it is indispensable to check that

- The assigned code and precharging pressure indicated on the name plate correspond to the intended use.
- The maximum working pressure of the accumulator is equal to or greater than the maximum working pressure of the hydraulic circuit.
- The working temperatures lie within the limits indicated on the name plate.
- The accumulator is undamaged and is assembled as close as possible to the user to ensure optimum performance.

**In addition, we recommend you**

- Protect the accumulator against heat sources, electric and magnetic fields, lightning, damp and adverse weather conditions.
- Leave a gap of about 200mm on the gas valve side which is necessary to use the charging kit.
- Leave the name plate visible.
- Install a non-return valve between pump and accumulator to prevent reversal.
- Install a shut-off valve and a dump valve to enable periodic checks or removals during normal operation. EPE safety blocks type B incorporate all the essential functions.

**IMPORTANT!!! It is strictly prohibited**

- **To use a group 1 fluid with an accumulator designed for a group 2 fluid.**
- **Welding supports and/or performing any other operation on the accumulator which may affect its mechanical properties**
- **To use the accumulator as a construction element for bearing external loads.**
- **To modify the accumulator without the manufacturer's consent.**

**IMPORTANT!!!**

- **Accumulator must be protected by installation of pressure relief valve according to directive 2014/68/EU.**

## 11. MAINTENANCE AND REPAIRS

Before performing operations that entail the disassembly and reassembly or the replacement of components of the accumulator, we recommend you contact the Marketing & Servicing Department of

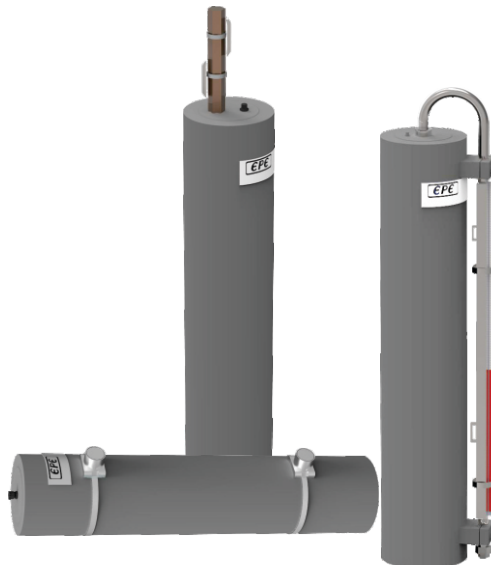
**EPE Process Filters & Accumulators Pvt. Ltd. – India.**

Telephone : 0091-40-23778803/23778804

Fax : 0091-40-23871447

e-mail : [business@epe-india.com](mailto:business@epe-india.com)

In all cases, before starting to do any work, it is indispensable to make sure that the accumulator is isolated from the system and that the precharging gas has been completely released. For this purpose we recommend use of the special PC type equipment.





1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18  
**AP - 35 - 375 - 180 - C - 2 - PPU - P - 0 - 0 - 0 - FV - 0 - G07F - 0 / P0:10 / - - -**

↑ indicate only if applicable ↗

1	<b>Series</b>	Piston Accumulator	<b>= AP</b>
2	<b>Nominal Capacity (Ltrs)</b>	Piston dia 50mm Piston dia 80mm Piston dia 100mm Piston dia 125mm Piston dia 180mm Piston dia 250mm Piston dia 350mm Piston dia 490mm	<b>= 0.25-1.5</b> <b>= 0.5-10</b> <b>= 0.5-15</b> <b>= 2-25</b> <b>= 6-100</b> <b>= 15-200</b> <b>= 100-400</b> <b>= 150-1000</b>
3	<b>Max working pressure (Bar)</b>	Piston dia 50mm Piston dia 80mm Piston dia 100mm Piston dia 125mm Piston dia 180mm Piston dia 250mm Piston dia 350mm Piston dia 490mm	<b>= 250</b> <b>= 300</b> <b>= 375</b> <b>= 330</b> <b>= 375 / 450</b> <b>= 220 / 350</b> <b>= 220 / 350</b> <b>= 120</b>
4	<b>Piston Diameter</b>	Piston dia 50mm Piston dia 80mm Piston dia 100mm Piston dia 125mm Piston dia 180mm Piston dia 250mm Piston dia 350mm Piston dia 490mm	<b>= 050</b> <b>= 080</b> <b>= 100</b> <b>= 125</b> <b>= 180</b> <b>= 250</b> <b>= 350</b> <b>= 490</b>
5	<b>Tube &amp; End Cover material</b>	Carbon Steel Carbon Steel - Externally Nickel Coated Stainless Steel Aluminium	<b>= C (standard)</b> <b>= N</b> <b>= X</b> <b>= A</b>
6	<b>Piston material</b>	SG Iron Aluminium Alloy Stainless Steel	<b>= 1</b> <b>= 2 (standard)</b> <b>= X</b>
7	<b>Piston speed &amp; Piston Seal material</b>	Speed 3 m/s   Polyurethane (PU) Seals Speed 3 m/s   PTFE + Nitrile Seals Speed 3 m/s   PTFE + Viton Seals Speed 3 m/s   PTFE + EPDM Seals Speed 3 m/s   Viton Seals Speed 3 m/s   EPDM Seals Speed 0.5 m/s   PU + PTFE Seals Speed 2 m/s   PTFE + Nitrile Seals Speed 2 m/s   PTFE + Viton Seals Speed 2 m/s   PTFE + Nitrile Seals Speed 0.5 m/s   PU + PTFE Seals	<b>= PPU (upto 180dia)-std</b> <b>= PTN (&gt; 180dia) -std</b> <b>= PTV (&gt; 180dia)</b> <b>= PTE (&gt; 180dia)</b> <b>= PVV (&gt; 180dia)</b> <b>= PEE (&gt; 180dia)</b> <b>= FPT (upto 180dia)</b> <b>= TTN (upto 350dia)</b> <b>= TTV (upto 350dia)</b> <b>= HTN</b> <b>= ATN</b>
8	<b>End Cap Seals</b>	Nitrile (NBR) Viton (FKM) Ethylene-Propylene (EPDM)	<b>= P (standard)</b> <b>= V</b> <b>= E</b>
9	<b>Piston Design</b>	Without Recovery Valve With Recovery Valve Special	<b>= 0 (standard)</b> <b>= V</b> <b>= S</b>

\* Before ordering, check for availability

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18  
**AP - 35 - 375 - 180 - C - 2 - PPU - P - 0 - 0 - 0 - FV - 0 - G07F - 0 / P0:10 / - - -**

↑ indicate only if applicable ↗

10	<b>Inner Surface</b>	Standard Others	= <b>0</b> (standard) = <b>S</b>
11	<b>Gas Side - design</b>	Standard Others	= <b>0</b> (standard) = <b>S</b>
12	<b>Gas Side - connections</b>	Gas Fill Valve - 5/8" UNF Gas Fill Valve - 5/8" UNF in SS Gas Fill Valve - 5/16" UNEF/Vg8 Gas Fill Valve - 1/4" BSP Gas Fill Valve - M16x2.0 Gas Fill Valve - Double Lock Military Valve Gas Fill Valve - M28x1.5 W/o Gas Fill Valve - With 3/4" BSP(F) port W/o Gas Fill Valve - With 1" BSP(F) port Others (xx - Design No. specified by EPE)	= <b>FV</b> (standard) = <b>FX</b> = <b>F1</b> = <b>F2</b> = <b>F3</b> = <b>F8</b> = <b>FM</b> = <b>G05F</b> = <b>G06F</b> = <b>SGxx</b>
13	<b>Liquid Side - design</b>	Standard Others	= <b>0</b> (standard) = <b>S</b>
14	<b>Liquid Side - connections</b> (Refer page 8 & 9 for standard connections)	1/2" BSP(F) 3/4" BSP(F) 1" BSP(F) 1-1/4" BSP(F) 1-1/2" BSP(F) 2" BSP(F) Others (yy - Design No. specified by EPE)	= <b>G04F</b> = <b>G05F</b> = <b>G06F</b> = <b>G07F</b> = <b>G08F</b> = <b>G09F</b> = <b>SLyy</b>
15	<b>Test certification</b>	Factory Testing CE/PED Design as per ASME - w/o U Stamp Design as per ASME - with U Stamp	= <b>0</b> = <b>8</b> = <b>7W</b> = <b>7U</b>
16	<b>Precharge Pressure</b>	Uncharged Condition Precharge Pressure in bar	= - = <b>XX</b>
17	<b>Piston Position Monitoring Devices</b>	Refer page 6	= -
18	<b>Other Variants</b>	Refer page 7	= -

\* Before ordering, check for availability



1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18  
**AP - 35 - 375 - 180 - C - 2 - PPU - P - 0 - 0 - 0 - FV - 0 - G07F - 0 / P0:10 / - - -**

↑ indicate only if applicable ↗

17	<p><b>Piston Position Monitoring Devices</b>                  (Refer page 14 Fig.10)</p>	<p><u>Standard Accumulator - Without any variants</u></p> <p>Electrical Limit Switching Device - Screw-in                  Electrical Limit Switching Device - Flanged                  'xxxx' Max. Stroke Length (in mm)                  One Switch - type NO                  One Switch - type NC                  Two Switches - NO near Accumulator &amp; NC far end                  Two Switches - NC near Accumulator &amp; NO far end                  'n' no. of Bistable Switches</p> <p>Walking Stick Design                  Magnetic Flapper Arrangement - for use with WS                  Position Transducer - for use with WS                  One Switch - type NO                  One Switch - type NC                  Two Switches - NO near Accumulator &amp; NC far end                  Two Switches - NC near Accumulator &amp; NO far end                  'n' no. of Bistable Switches</p> <p>Exit Rod - Gas Side                  Exit Rod - Liquid Side                  One Switch - type NO                  One Switch - type NC                  Two Switches - NO near Accumulator &amp; NC far end                  Two Switches - NC near Accumulator &amp; NO far end                  'n' no. of Bistable Switches</p> <p>Ultrasonic Position Switch Arrangement - External                  'n' no. of Ultrasonic Position Switch</p> <p>Ultrasonic Position Switch Arrangement - Internal</p> <p>Wire Position Monitoring Device with Transducer &amp; Display</p>	<p>= --</p> <p>= <b>ES</b>                  = <b>EF</b>                  = <b>-xxxx</b>                  = <b>-1NO</b>                  = <b>-1NC</b>                  = <b>-2OC</b>                  = <b>-2CO</b>                  = <b>-nBS</b></p> <p>= <b>WS</b>                  = <b>-MF</b>                  = <b>-PT</b>                  = <b>-1NO</b>                  = <b>-1NC</b>                  = <b>-2OC</b>                  = <b>-2CO</b>                  = <b>-nBS</b></p> <p>= <b>XG</b>                  = <b>XL</b>                  = <b>-1NO</b>                  = <b>-1NC</b>                  = <b>-2OC</b>                  = <b>-2CO</b>                  = <b>-nBS</b></p> <p>= <b>UE</b>                  = <b>-nUS</b></p> <p>= <b>UI</b></p> <p>= <b>WP</b></p>
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\* Before ordering, check for availability

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18  
**AP** - **35** - **375** - **180** - **C** - **2** - **PPU** - **P** - **0** - **0** - **0** - **FV** - **0** - **G07F** - **0** / **P0:10** / **-** - **-** - **-**

↑ indicate only if applicable ↗

18	<b>Other variants</b>	<p><u>Standard Accumulator - Without any variants</u></p> <p><b><u>Gas Side Variants</u></b>                  Lifting Hooks - 2 Nos.                  Adapter for connecting 1/4" Gauge (without gauge)                  Adapter with xxx bar 63mm Pressure Gauge                  Adapter with xxx bar rupture disc                  Adapter with xxx bar rupture disc + 1/4" BSPF Port                  Adapter with xxx bar rupture disc + yyy bar 63mm Gauge                  Adapter with xxx bar rupture disc + 1/4" NPTF Port                  Adapter with xxx bar rupture disc + 3/8" NPTF Port                  Adapter with xxx bar rupture disc + 1/2" NPTF Port                  Adapter with VS214 Gas Safety Valve set at xxx bar                  Adapter with VS224X Gas Safety Valve set at xxx bar                  Adapter with 1/4" BSP Needle Valve                  Adapter with 1/4" BSP Needle Valve in SS                  Adapter with PGSV (Pressure Gauge Shut-off Valve)                  Adapter with PGSV + xxx bar 63mm pressure gauge</p> <p><b><u>External Variants</u></b>                  Finish Paint - RAL-5003</p> <p><b><u>Internal Variants</u></b>                  Flushing to NAS-10                  Flushing to NAS-9                  Flushing to NAS-8                  Flushing to NAS-7                  Flushing to NAS-6                  Flushing to NAS-5</p>	<p>= --</p> <p>= <b>G07/2</b>                  = <b>G11</b>                  = <b>G12(XXX)</b>                  = <b>G13(XXX)</b>                  = <b>G14(XXX)</b>                  = <b>G15(XXX/YYY)</b>                  = <b>G16(XXX)</b>                  = <b>G17(XXX)</b>                  = <b>G18(XXX)</b>                  = <b>G19(XXX)</b>                  = <b>G20(XXX)</b>                  = <b>G21</b>                  = <b>G22</b>                  = <b>G23</b>                  = <b>G24(XXX)</b></p> <p>= <b>E01</b></p> <p>= <b>F10</b>                  = <b>F09</b>                  = <b>F08</b>                  = <b>F07</b>                  = <b>F06</b>                  = <b>F05</b></p>
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